Progress Report of the VIAQ (Vehicle Interior Air Quality) Informal Working Group

Paris, May 14-15th 2019

Chair: Andrey KOZLOV, Russian Federation
Co-Chair: Jongsoon LIM, The Republic of Korea
Secretary: Mark POLSTER, Ford
During the 173rd WP.29 session in Geneva (14-17 November 2017), a proposal for a new Mutual Resolution (M.R.3) for the 1958 and the 1998 Agreements concerning Vehicle Interior Air Quality (VIAQ) was adopted (ECE/TRANS/WP.29/2017/136). The final text of Mutual Resolution M.R.3 was published at the UNECE site on 1 November 2018 as the document ECE/TRANS/WP.29/1143.
ToR for the Second Stage

Terms of reference

✓ Identify and collect the information and research data on interior air quality and its relevance for vehicles, taking into account the activities being carried out by various governments, and non-governmental organizations.

✓ Identify and understand the current regulatory requirements with respect to vehicle interior air quality in different markets.

✓ Identify, review and assess existing test procedures suitable for the measurement of harmful substance into the vehicle cabin (including test modes, sample collection methods and analysis methods, etc.)

✓ Develop provisions and test procedures in a recommendation by including Part 3 in the Mutual Resolution No. 3.
ToR for the Second Stage

Timeline

➢ January 2020: Submit the draft document to GRPE
➢ June 2020: Adoption of the draft document by GRPE
➢ November 2020: Adoption of the draft document by WP.29

• Half of working items almost closed
  • Make a drafting group

• Develop provisions and harmonized test procedures.
  • VIAQ recommendation (a new part of M.R.3)
15th VIAQ IWG Meeting

- Geneva, Switzerland, January 9th 2019
- Half a day

16th VIAQ IWG Meeting

- Paris, France, May 14-15th 2019
- Two days
Working Items

1. Vehicle Category
2. Test Vehicle age/millage
3. Substances to be Measured
4. Meteorological Conditions
5. General Test Conditions
6. Test Modes
7. HVAC Modes
8. Test Procedure
9. Measurement Methods
10. Sampling Points
11. Sampling Method
12. Test Protocol
1. Vehicle Category

Agreed Item

Category 1-1
New cars from series production
Millage
3 000 - 15 000 km
### 3. Substances to be Measured

<table>
<thead>
<tr>
<th>Russian Standard</th>
<th>Agreed substances</th>
<th>Korea</th>
<th>For discussion (see VIAQ-13-04 and VIAQ-14-04)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formaldehyde $\text{CH}_2\text{O}$</td>
<td>Carbon monoxide CO</td>
<td>Carbon monoxide CO</td>
<td>Particulate matter (PM)</td>
</tr>
<tr>
<td>Nitrogen dioxide $\text{NO}_2$</td>
<td>Nitrogen oxide NO</td>
<td>Nitrogen oxide NO</td>
<td></td>
</tr>
<tr>
<td>Nitrogen oxide NO</td>
<td>Nitrogen dioxide $\text{NO}_2$</td>
<td>Nitrogen dioxide $\text{NO}_2$</td>
<td></td>
</tr>
<tr>
<td>Carbon monoxide CO</td>
<td>Formaldehyde $\text{CH}_2\text{O}$</td>
<td>Saturated hydrocarbons ($\text{C}_2\text{H}_6$...$\text{C}<em>7\text{H}</em>{16}$)</td>
<td></td>
</tr>
<tr>
<td>Methane $\text{CH}_4$</td>
<td></td>
<td>Korea</td>
<td></td>
</tr>
</tbody>
</table>
4. Meteorological Conditions

Agreed Item

✓ ambient air temperature: from -7°C to +30°C
✓ relative humidity: from 30% to 90%
✓ atmospheric pressure from 84.0 to 108.7 kPa
5. General Test Conditions

1. Test road: straight road with the slope up to 6.0%.
2. No other vehicles with engine running or other sources of air pollution are permitted in the testing zone.
3. General inspection should be checked before testing.
4. Windows, doors and ventilation hatches should be closed.
5. HVAC outside flaps have to be closed.
6. A/C should be turned off.
## 9. Measurement Methods

<table>
<thead>
<tr>
<th>Substances</th>
<th>Proposed measuring methods</th>
<th>Type of analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH$_2$O</td>
<td>1) High performance liquid chromatography (HPLC) UV detection</td>
<td>1) Stationary analysis at the laboratory after preliminary air sampling to the cartridges</td>
</tr>
<tr>
<td></td>
<td>2) Gas chromatography (GC) with nitrogen phosphorus detection (NPD), or mass spectrometer (MS) and capillary or packed columns</td>
<td>2) Stationary analysis at the laboratory after preliminary air sampling to the cartridges</td>
</tr>
<tr>
<td></td>
<td>3) Photo-electric colorimetric method</td>
<td>3) On-line (express) analysis</td>
</tr>
<tr>
<td>NO, NO$_2$</td>
<td>1) Chemiluminiscence (CLD)</td>
<td>1) On-line (express) analysis or stationary analysis at the laboratory after preliminary air sampling to the sealed bags</td>
</tr>
<tr>
<td></td>
<td>2) High-sensitivity electrochemical detection (ECD)</td>
<td>2) On-line (express) analysis</td>
</tr>
<tr>
<td>CO</td>
<td>1) Infrared photoacoustic spectroscopy</td>
<td>1) On-line (express) analysis</td>
</tr>
<tr>
<td></td>
<td>2) Electrochemical detection (ECD)</td>
<td>2) On-line (express) analysis</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>1) Light-scattering laser photometer need additional discussion</td>
<td>1) On-line (express) analysis</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10. Sampling Points

The point between headrests of front seats
Test Modes Discussion

1. Idling Test

2. Constant Speed Test
   ✓ Movement at constant speed 50 km/h
   ✓ Movement at constant speed 90 km/h
   ✓ Movement at constant speed 130 km/h

3. Acceleration Test
   ✓ Acceleration from a speed of 60 km/h at wide opened throttle to 130 km/h and deceleration at closed throttle to 60 km/h repeated by 8 times
Discussion of Idle Test Conditions and Facility (Russian Federation proposals)

Open area without any other sources of pollution

1, 2 – anemometers; 3 - weather vane

Test conditions:
- wind velocity 1.0...3.0 m/s
- velocity difference between anemometers 1 and 2 not more than 0.2 m/s
- wind direction deviation not more than 15 deg.

HVAC mode: Recirculation ON; Ventilator speed - MAXIMAL

It is acceptable to use air blower to simulate air movement around tested vehicle.
Discussion of Idle Test Conditions and Facility (OICA proposals)

**Test location:**
- large fan(s), wind tight area
- Temperature: 5° C to 25° C
- Wind speed: 3.5 m/s ± 0.5 m/s, direction is perpendicular rear vehicle
- Relative humidity: 30 % to 90 %
- Atmospheric pressure: 85 to 110 hPa
- Verify uniformity of wind at two side points, 0.5 m from each side of vehicle

**Side Walls to limit cross wind**
**Constantly monitor Center location, 0.5 m**
Developed two documents:

✓ Update of part I of Mutual Resolution No. 3 (VIAQ-16-06)
✓ Draft of part III of Mutual Resolution No. 3 (VIAQ-16-08)

as parts of Revision 2 of Mutual Resolution (M.R.3) on Vehicle Interior Air Quality
Next VIAQ IWG Meeting

➢ 17th VIAQ IWG Meeting (TBD)
   • 15-18 October (Munich) or 4-8 November (Geneva) or 6-7 November (Moscow)
   • Two days

➢ 18th VIAQ IWG Meeting (TBD)
   • Geneva, Switzerland, January 8th 2020
   • Half a day